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ABSTRACT

Business is recognizing that the associate degree is a necessity in high technology fields. Innovative practices link businesses with community colleges, allowing apprentices to gain basic job skills and a higher education. A research study explored three industries and their relationship with community colleges: automotive, construction, and maritime. The research design, a structured case study, developed a theoretical model against which data collected was analyzed. A national search for businesses and colleges cooperatively engaging in apprenticeships was undertaken. College participation varied from program to program. Several significant model components were suggested across industries and geographic regions that can serve as catalysts for community college cooperative apprenticeship program development. It was concluded that apprenticeship is a mechanism for bringing together human and capital resources. Dual enrollment of apprentices in associate degree programs should be promoted because it is the most cost-effective mechanism for organized labor to provide worker training and control its ultimate delivery and quality. (NLA)

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Apprenticeship 2000: A model for community college collaboration with business and industry. Results of a national study involving three industries.

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Apprenticeship 2000: A model for community college collaboration with business and industry. Results of a national study involving three industries.

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We are witnessing a revolution in American education today as business and industry calls upon us to establish closer working relationships aimed at providing more meaningful and successful worker training programs. One way for this to happen is the cooperative apprenticeship, linking post-secondary education and employers (and sometimes secondary education, organized labor, and/or the government).

Purpose of the Study

This presentation describes the results of a sponsored research study into apprenticeships and post-secondary education.[1] I will describe the activities of three industries and their linkages with community colleges: (1) the automotive industry; (2) the construction industry with organized labor; and (3) the maritime industry. In each case innovative practices have linked business with the college, allowing the apprentice to gain basic job skills and a higher education.

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[1]. This research was sponsored in part by a grant from the PSC-CUNY Research Program, Grant #661248, 1991-1992.

A Theoretical Framework

The literature in both education and business is rich with dialogue concerning business/education collaboration and linkage. These practices have become a necessity. Increasing workplace technological requirements are mandating an equivalent of two years of post-high school education and training for the majority of the workforce.[2] At the same time worker demographics are changing and more non-traditional students are seeking employment. This concern is underscored by a shrinking pool of workers from which to draw; and all too severe literacy problems among American workers.[3] Training costs are rising significantly. A concern of American business and industry is to identify a more effective and appropriate means for attracting, training, and educating a workforce approaching the 21st Century. Business and industry needs the assistance of their local educational institutions to deliver cost-effective quality training and related education. In fact the major goals and focus of the Carl D. Perkins Vocational and Applied Technology Education Act of 1990 (PL 101-392) address these kinds of cooperative educational arrangements.

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[2]. It is suggested that only 22 percent of all occupations presently require a college degree. However the median years of education required by the new jobs created between 1984 and 2000 will be 13.5 compared to 12.8 for the current workforce. W.B. Johnston and A.E. Packer. (1987, June). Workforce 2000: Work and workers for the twenty-first century. Indianapolis, IN: Hudson Institute, p. 97. Also see: M.P. Eurich. (1990). The learning industry: Education for adult workers. Princeton, NJH: The Carnegie Foundation for the Advancement of Teaching.

[3]. While white males have been the most employable segment of the U.S. population, having the highest levels of education and training, they are becoming scarce. They presently comprise approximately 47 percent of the workforce; by the Year 2000, they will account for only 15 percent of the workforce. We expect to see an influx of some 600,000 immigrants to the U.S. by the turn of the Century. It is expected that most of these will be females, Hispanics, and Asians (see Packer, p. 97).

An increasingly used process is the apprenticeship -- cooperatively sponsored by employers and the community college -- providing access to college degree-level technical education for the worker. These cooperative ventures also promote local economic development initiatives by preparing workers for existing jobs in a timely manner. These cooperative practices should become an accepted practice -- rather than a nifty innovation. An understanding of how to make these cooperative linkages happen is a must for educators and entrepreneurs alike.

Apprenticeship - A Possible Solution

Apprenticeship becomes even more attractive as a training process when employers can reap the benefits of a community college to: (1) operate the program; (2) provide complimentary technical and general education; (3) provide student recruitment, screening, testing and remedial education; (4) recruit and train trades instructors; and (5) access external funding to operate the programs.[4] Additionally, the community college can grant credit for the program, including the apprenticeship component, and confer college degrees for program completion. What does each of the partners bring to, and derive from this partnership, in order to facilitate such a working relationship?

As we approach the Year 2000, 75 percent of all jobs will require post-secondary education -- best delivered by the community

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[4]. W.L. Fillippini. (1979, January). "Training for a place in the sun." VocED, 51-53.

college.[5] While partnerships with community colleges to support apprenticeship training is not new or unique, business is beginning to recognize that the associate degree is a basic necessity in high-technology fields.

The Community College

Community colleges are unique institutions of higher education. They have been active in apprentice training for some time. While generally providing related classroom training, some have also designed programs to meet the increasing technological needs of the firms and industries they serve, and simultaneously providing economic development support to businesses and their communities.[6],[7]

Lastly, community colleges, from an enrollment perspective, are realizing the benefits to be derived from working with industry and labor through apprenticeship.[8] Generally, programs run an average of three academic years, and enroll better than average class sizes.[9] Business generally assists by staffing the technical courses and providing specialized equipment and

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5. D. Parnell, President, American Association of Community and Junior Colleges in The School-To-Work Connection, U.S. Department of Labor, Employment and Training Administration, 1991.

6. J.A. Cantor. (1990, Summer). "Job training and economic development initiatives: A study of potentially useful companions." Educational Evaluation and Policy Analysis, 12(2), 121-138.

7. L.L. Whitworth. (1982, January/February). "New pathways to apprenticeship." VocED, 38-40.

8. F. Renz & Styer, M. (1986, October). Community colleges and apprenticeship training: A winning partnership. Paper presentation at the National Council for Occupational Education, San Diego, CA, 141 pgs.

9. G. Horstrup and S. Kracht. (1980, Spring). "Apprenticeship program - A solution to low enrollment problems." Journal of Studies in Technical Careers, 11(7), 530-535.

materials. Colleges thus have an opportunity to operate state-of-the-art programs for little capital outlay. Herein is a quid pro quo.[10]

The Study

A structured case study was the research design of choice for this study. A theoretical model was built against which the data collected was analyzed. Figure One presents the hypothesized linkage model.

A national search for both businesses and colleges cooperatively engaging in apprenticeships was undertaken. On-site reviews and telephone interviews were made with entrepreneurs, educators, union officials, government officials, apprentices, and others having first-hand knowledge of program operations and outcomes. Data collected were analyzed in light of the theoretical model. A model emerged as a result of the study.

Findings

Collaboration and linkage does not happen easily. Where it is happening, the factors causing it to succeed generally are creditable to individual people of vision and personality. Yet there are several significant model components which can be suggested across industries and geographies which can serve as a catalyst for community college cooperative apprenticeship program development.

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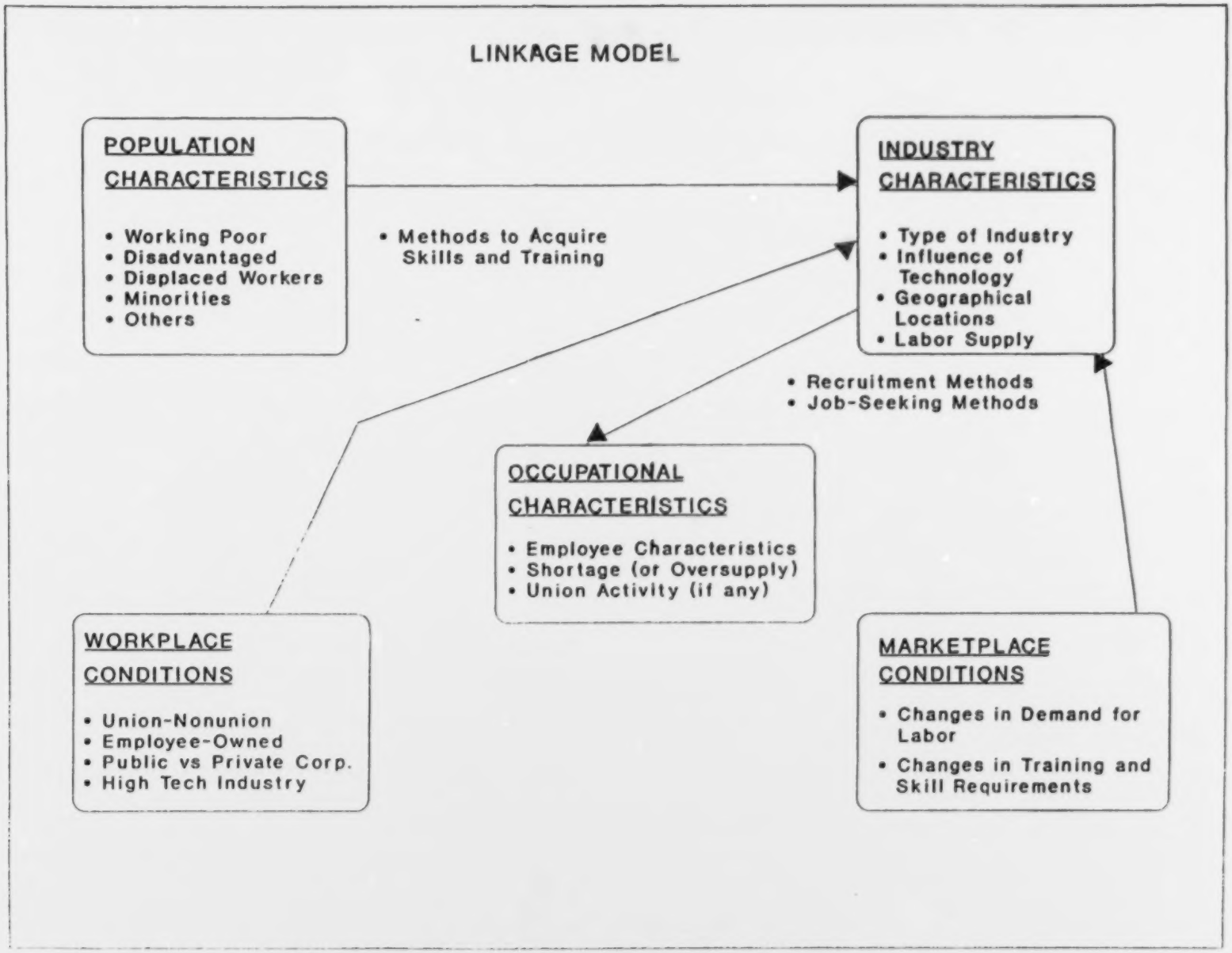
[10]. S. F. Hamilton. (1990). Apprenticeship for adulthood: Preparing youth for the future. New York: The Free Press.


LINKAGE MODEL
POPULATION CHARACTERISTICS
• Working Poor
• Disadvantaged
• Displaced Workers
• Minorities
• Others
• Methods to Acquire Skills and Training
INDUSTRY CHARACTERISTICS
• Type of Industry
• Influence of Technology
• Geographical Locations
• Labor Supply
• Recruitment Methods
• Job-Seeking Methods
OCCUPATIONAL CHARACTERISTICS
• Employee Characteristics
• Shortage (or Oversupply)
• Union Activity (if any)
WORKPLACE CONDITIONS
• Union-Nonunion
• Employee-Owned
• Public vs Private Corp.
• High Tech Industry
MARKETPLACE CONDITIONS
• Changes in Demand for Labor
• Changes in Training and Skill Requirements

Apprenticeships and the Community College

The Automotive Industry

The automotive industry including vehicle manufacturers, retail stores, dealer trade associations, labor unions and after-market suppliers has successfully adopted cooperative apprenticeships as a training process. The concept links local auto dealers, their trade associations, vehicle manufacturers and independent repair shops with the community college.[11]

Beginning in the early 1970s, the National Automobile Dealers Association (NADA) recognized a need for a more technically skilled mechanic to meet the ever increasing automotive technology. NADA designed an automotive technician apprenticeship program which was implemented through selected community colleges nationwide. This program included 6,000 hours of apprenticeship instruction in participating auto dealerships under the direction of a master technician. The apprentice also would attend a participating community college after work, several times a week over a period of three years. College work includes general academic, business management and automotive and technically-related courses leading to an associate degree in automotive service management. College credit is also awarded by many participating colleges for the apprenticeship work at the dealership.

Over the last decade, several major automotive manufacturers have established their own cooperative programs with community

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[11]. Cantor, J.A. (1991, October). "Apprenticeship: The Auto Industry's New Model." Vocational Education Journal, pp. 26-29.

colleges. Not all of these programs are called apprenticeships but they bear, in most all respects, the attributes of an apprenticeship. Why such a program? The car companies believes that through attaining an associate degree, a technician will have a desirable general and technical education, and will have mastered vital communications, business management, and diagnostic problem-solving skills -- all requisites for dealing with customers and changing technology.

The specific programs are:

General Motors Corp developed its Automotive Service Education Program (ASEP) as a cooperative program with dealers and their local community colleges. GM also contracts with many community colleges as regional training centers for technician upgrade and new product training.

Ford Motor Company's cooperative apprenticeship program is called ASSET. The program began in 1985 at Broward Community College in Florida. Ford provides curriculum materials, vehicle components and training for college instructors. Ford also contracts with the colleges for in-service training for dealer technicians. There have been over 850 ASSET program graduates to date.

Toyota Motor Corp. initiated a cooperative program in 1980 called T-Ten. More than 800 students have graduated from T-TEN apprenticeship programs at 63 participating colleges. Toyota supports their dealers and the community colleges with scholarships and other student financial aids.

Chrysler Motor Corp. sponsors a PROCAP program similar in most respects to GM and Ford programs. *Nissan Motor Corp.* sponsors a PROCAP program.

Each of these programs are designed around the following elements:

A manufacturer-oriented curriculum. GM's ASEP was developed in cooperation with more than 50 community colleges nationwide. Each of the manufacturers work with their participating dealers and colleges to integrate their own curricula materials. Toyota's T-TEN program materials and program requirements focus on Toyota technology using Toyota products as teaching aids. At many colleges, courses are condensed into shorter time frames to allow for the all important cooperative work experience part of the program. Many of the programs also have student organizations such as VICA participating in the apprenticeship programs.

Program quality control. In the automotive industry most manufacturers require their community college programs to meet National Automotive Technology Educational Foundation (NATEF) standards. This serves as a benchmark of the program's state-of-the art excellence. They also require the program's instructors to be Automotive Service Excellence (ACE) certified, and product trained by their companies.

A cooperative format. Most participating colleges offer an alternating course of study that has an apprentice in college classes full time for one semester; then working full time at a

dealership for the next semester. Some colleges use a pattern of eight to nine weeks in school and eight to nine weeks on the job.

College credit for workplace experience. Credit earned for the apprenticeship portion of the program varies from 6-12 semester hours. This is an essential element to make the cooperative learning experience a genuinely valuable program component.

Top-notch facilities. All of the manufacturers require that a college's facilities meet their standards before they will enter into an agreement to sponsor a program. Many manufacturers provide grants to help college develop or improve their facilities.

Articulation. Several colleges have articulation agreements with four-year colleges to facilitate associate degree transfer to bachelors programs. For example, Bessemer College has one with Auburn University; Brockhaven College with the University of North Texas.

The automotive industry also helps colleges and students in other ways: First, recruitment of students; - dealers and manufacturer representatives work with colleges to recruit students through career days, handouts, videos, TV advertisements, etc. Financial assistance is also an automotive industry perk. Toyota provides students accepted in the program with $500 scholarships for tuition; a $1500 basic tool set from Snap-On Tool Corp; and reimbursement for ASE certification. Toyota will also award a technician advanced study in its own certification program when successfully completing a T-TEN program. Honda covers 50% of apprenticeship students college tuition, with participating dealers

paying an allowance of $750 per student for initial tools. Other resources include tools and equipment. Manufacturers commonly donate equipment, training aids, and materials to participating colleges. GM reports that its donations amount to $20 million a year on average. Manufacturers also provide training and development programs for college instructors during the summer break periods. Ford sends college instructors to its corporate training school six times a year. GM has a similar program and sees this as a form of technology transfer from corporation to community.

The Community College Role

The cooperative apprenticeship idea is a new twist on cooperative education and work-based learning programs. Yet it bears a strong resemblance to traditional apprenticeship. In both there is a system of formal structured training, the student earns a realistic wage, the employer makes a long-term commitment to the student and the training is for a defined period of time.

Many community colleges have joined with one or more manufacturers to operate cooperative apprenticeship programs in automotive technology. The National Association of College Automotive Teachers (NACAT) estimates that there are about 500 such programs operating throughout the U.S. and Canada. For example, Shoreline Community College in Seattle has offered automotive cooperative apprenticeship programs for over 15 years. It currently operates GM-ASEP, Toyota-T-TEN, and Honda programs. The college serves a community with more than 200 car dealers and

16,000 automotive employees. Other exemplary programs are: Monroe Community College, Rochester, NY with a generic NADA program, plus Toyota, GM and Nissan. Central Piedmont CC in North Carolina with GM-ASEP, Toyota-T-TEN, and a generic program.

The Construction Industry & Organized Labor's Programs

Two construction industries sponsoring apprenticeship training programs in cooperation with organized labor were also analyzed: (1) The International Brotherhood of Electrical Workers 'IBEW) Local #3, Flushing NY; and (2) The International Union of Operating Engineers (IUOE) through locals nationwide.

In the fall of 1977 IBEW's Local #3 leadership ventured forward with an idea promoted by one of its most dynamic leaders, Harry Van Arsdale -- to have new apprentices in the construction electricians division of the local complete an Associate Degree in Labor Studies as a required part of their apprenticeship training. This decision to add such a requirement, and the accompanying effort to implement the educational innovation, was unparalleled in the history of organized labor and apprenticeship training.

Why such a requirement? First, Local #3 and its employer - contractors represented by the National Electrical Contractor's Association (NECA) view a commitment to education as a well established tradition in the labor movement. Additionally, the philosophical commitment to the apprenticeship program and to higher education and the associate degree was so strong at that time, that the union leadership established the degree program as mandatory in order to serve both the union's and industry's needs.

Second, the local leadership viewed the need to raise the educational level of working people, thus improving their social status and self-esteem, -- and that of all workers as well. They foresaw payoffs for organized labor by impacting positively on the qualifications and characteristics of the bargaining unit; thus they believed, strategically positioning labor for better union wage packages in collective bargaining.

Next, Local #3's leadership believes that a union concerned about their own public image has a stake in educating both the public and their members about the labor movement. (Eighteen credits of the Associate Degree program for apprentices is in Labor Studies). Better educated apprentices make better union members -- sympathetic to the cause: an argument touted for the program. In all, this college program is part of a total package including technical skills training, a job in the trade, membership in the union; and career mobility.

The IUOE Programs. Likewise, IUOE representing heavy equipment operating engineers in the construction industries supports dual-enrollment degree programs nationwide. In the late 1970s IUOE initiated 53 associate degree programs in 20 states, at that time involving 2,300 apprentices.

IUOE leadership believes that a parallel exists between the technical knowledge and educational discipline required of an indentured apprentice in the operating engineer trades, and the knowledge required of an undergraduate student in the first two years of study. Like most high technology industries, rapid

technological changes in equipment and building processes necessitate better trained personnel in the operating engineer trades. IUOE does view these programs as a means to help operating engineers keep up with the rapid charges taking place in the trades by working cooperatively with management and public education. They also view the college degree as a means to achieve better trained management personnel in the future.

Program Financing. The New York State Department of Labor supports the IBEW apprenticeship program with a stipend of $1.00 per training hour per apprentice. About $13.6 Million (in 1990) was received by the New York State Education Department under the Perkins (Technology Education) Act (CFR 2929). These funds support the stipend of $1 per training hour as well as instructor costs. The IBEW contract with the NECA specifies that one (1) percent of the weekly production payroll be remitted to an educational trust fund. The basic funding for a program operated by an IUOE labor union also comes from the one (1) percent journeyman wage tax levied upon the employer. The average IUOE journeyman's wage is $28 hour which generates approximately $4.5 million annually for training. Note that the employer is also supporting the apprentice on the payroll as an entry-level worker during the four (4) year period (including benefits). U.S. Code (CFR 2929) stipulates that 62% of an average journeyman wage be paid to registered apprentices. This is also a cost of training. Table 1 summarizes construction industry-union-community college linkages for apprenticeship program delivery.

Table 1

The Community College's Involvement with Dual-Enrollment Programs

College (State)	College Interface with union	Number of credits granted for apprenticeship	Yearly Number of union sponsored students	College Paid Instructor
Fox Valley (WI)	Limited	12	900	Yes
Allegheny Co (PA)	Limited	18	<100	Yes
Central (AZ)	Yes	15	65	Yes
Catonsville (MD)	Yes	24	120	Yes
CC of RI	Limited	7	<100	Yes
Empire State (NY)	Yes	32	2000	Yes

The contractor's payroll tax-levy for apprenticeship training varies from IUOE local to local. In all of the reviewed cases, funding for dual enrollment programs was an issue for both unions and colleges. None of the IUOE locals support full associate degree costs for the apprentice. The Maryland programs offered the most assistance to dual - enrollment candidates through college tuition aid. Major issues cited by IUOE program coordinators were: (1) various state policies for state reimbursement to the college for apprenticeship college credit earned; (2) tuition aid available for apprentices; and (3) instructor salary support for apprenticeship courses.

The Curriculum and Instructional Issues. Local #3's program was designed to provide college credit for the on-the-job apprenticeship training, as well as to provide the related trade theory classes held in the evening. The trade theory is taught by IBEW journeymen. The technical portion of the curriculum was adopted from the National Joint Apprenticeship Training Council (NJATC) standards. ESC adopted their curriculum for that 30 credit portion of the program. The "Program on Non-Collegiate Sponsored Instruction (PONSI)" standards are used by ESC to equate the apprenticeship on-the-job (OJT) training and related trades classroom instruction into college level credits (30 credits) towards the AS degree. To earn the OJT credits, the apprentice must pass a competency test and complete the electrical theory courses. The competency test is modeled after the NJATC competency standards; and is both written and practical skills demonstration competencies.

Whereas ESC provides broad arts and sciences courses including written and oral communications, mathematics, labor studies, history and sociology, IUOE programs vary according to the local college curriculum, but tend to emphasize technology. At this point it appears that IBEW's Local #3 emphasizes a more broad based education for its apprentice.

The IUOE locals use national standards to develop and implement their programs. Each local has curriculum autonomy. IUOE college programs vary in means for award of credit for the OJT. The Maryland college programs have a stipulated written

agreement for 18 credits or 1/3 of the degree program. A brochure describes the process for earning credit to the apprentice degree candidate early into the program. Arizona also appears to have this kind of process for eleven (11) college credits; other programs use college-internal challenge for credit processes (WA); ACE/LEAP process (RI); and less formally structured processes elsewhere.

Faculty. The ultimate success of a dual-enrollment program is with its instructors -- therefore use of any and all appropriate resources for instructor training is essential. There are 98 instructors and 4 general assistants in the IBEW program. The New York City School District licenses, evaluates, and trains these instructors. Instructors sit on committees and work with the director to plan and operate the program. Together they review the curriculum annually. It is interesting to note that many union and contractor leaders are former apprentices. This lends credence to the belief that today's apprentices make tomorrow's labor leaders.

Catonsville Community College has a full - time college apprentice program coordinator to interface with all unions in program delivery. Catonsville services IBEW, IUOE, and other union programs in an off-site faculty dedicated to these kinds of programs. Other colleges such as Fox Valley Technical College support the development of apprenticeship instructors through instructor training at universities such as at the University of Wisconsin at Stout.

Program Length. Local #3 runs a 4-year, state-registered program, whereas IUOE programs are 3 years in length. After the 4th year, IBEW apprentices are no longer registered with the state, but they are under the obligation/jurisdiction of the union for another 18 months until they become full journeymen (5 1/2 years).

All apprentices must work a minimum of 35 hours per week under a journeyman electrician. If construction is slow and there is no work for apprentices for a period of time, apprentices must work about 80% of that year to advance. Students in both of these programs must attend on their own time and they are not paid to attend.

The Maritime Industries

The maritime shipbuilding and repair industries in the U.S. include both U.S. Naval shipyards and private sector shipbuilding and repair (overhaul) firms. Collectively these industries have traditionally been strategically critical to our national defense and our economic competitiveness. World events of the 1990's causing a decline in the need for defense expenditures exacerbated economic conditions in the U.S. when these industries began personnel and materials cutbacks. Therein, our attention to maintaining a trained and competent workforce, even in times of peace, is essential.

U.S. Navy apprenticeship training programs are perhaps the oldest continually operating apprenticeships in the United States. As a form of structured training, apprenticeship training dates back to U.S. colonial days. Yet, it remains one of the most vital

forms of training for today's military and civilian defense worker, especially in high-technology areas. Apprenticeship has a long tradition in the civilian workforce of the U.S. Navy. The Navy's first "apprentice boy" was hired in the Washington Navy Yard in 1810. The first formal apprentice school in the U.S. Navy opened at Mare Island Navy Yard in 1858 when that yard was under the administration of David Farragut. Today all eight Naval shipyards (Portsmouth, N.H., Philadelphia, PA, norfolk, VA, Long Beach, CA, Mare Island, CA, Puget Sound, WA, and Pearl Harbor, HI) operate some form of Apprentice training. Likewise, many, if not all, commercial firms also see apprenticeship as a primary means for training their technical and managerial workforces. For this study the Naval programs and programs at Norfolk Shipbuilding and Drydock Company, Newport News Shipbuilding and Drydock Company, Virginia's largest private sector employer, Bath Iron Works, NASSCO San Diego, and Avondale Shipyards were reviewed.

Rationale for Program Operation. The Workforce 2000 Report (Johnston and Packer, 1987) is supported by research conducted by the U.S. Navy's Office of civilian Personnel Management, which indicates that there will be a serious shortage of skilled workers in the American maritime workforce over the next 12 years. In a report issued by the Department of the Navy Apprenticeship Program Task Force, these facts were reiterated and highlighted. Among these are also significant changes projected in workforce demographic characteristics, and increases in technology.

Apprenticeship is recognized by business and defense leaders

as an effective training tool to maximize available training resources and talents to prepare a labor force to meet the challenges, both economic and strategic defense, towards the 21st Century. It offers the Navy a very viable mechanism for training civilian workers for various positions, including trade and technical, office occupations, and management. Apprenticeship training also offers promise in meeting some of the challenges which the Navy and other defense organizations are facing over the next several decades.

The U.S. Navy Apprenticeship. The U.S. Navy's eight shipyards (NSYs) each operate apprenticeship training programs for their new technical workers. These programs provide training in approximately 43 different trade areas, depending on the needs of the shipyard. Naval shipyards for some years have been almost completely in the repair as opposed to the ship building business. Despite recent modernization and automation in the industry, effective and safe ship repairs remain dependent upon the knowledge and abilities of large numbers of highly skilled craftspeople. There are no assembly lines in ship repair. Craftspeople work independently at non-repetitive tasks and must apply analytical abilities and initiative, as well as judgement to accomplish their work. Good reading skills are required for interpretation of job orders, technical manuals, and specifications; mathematics supports a variety of work-related calculations.

The NSY apprenticeship programs currently provide training for entry-level workforces varying from 38 trainees at Long Beach NSY

to 661 at Norfolk NSY. In total there are 2651 active apprentices across the eight yards. This represents approximately 10% of the total NSY worker population -- a goal that the U.S. Navy strives to maintain in order to ensure a continual supply of trained manpower. Apprentice-trained journeymen are a majority of each of the shipyard workforces.

However, the apprenticeship programs are important to these shipyards not only as a source of skilled workmen but also because apprentice-trained journeymen provide the pool from which supervisors and managers are drawn. Some 87% of the Naval shipyard superintendents (heads of the major shop and trade groups) are former apprentices. This system of internal advancement provides shipyards with dedicated upper-level management skilled in the "nuts and bolts" of ship construction and repair. Herein lies the principal reason for sponsoring higher educational opportunities for these workers, through coordination with local community colleges and other institutions of higher education.

The apprenticeship training in all trades is designed in a 4 year program. However, recent dialogue among the yards and the Naval Sea Systems Command, and the Navy's Office of Personnel Management indicates a desire to shorten this to 3 years for some trades where appropriate, to reduce costs and facilitate worker entry to journeyman ranks. Apprenticeship training program design is modified locally in order to ensure that each program meets the local shipyard's needs and requirements. Each of the eight Naval shipyards is unique in its organizational configuration, the

availability of local educational services, worker population characteristics, and potential pool of labor. Many of these variations apply to private yards as well. Each of the yards' personnel department apprentice training coordinators matches their apprentice-related training requirements to the local community college program offerings. Fully realizing that the next generation of shipyard management will come from these apprentice ranks, encouragement is given to the apprentice to complete an associates level college degree in conjunction with the apprentice training. Some of the private sector firms require degree completion to advance to journeyman status.

Costs for apprenticeship training are borne by the government. Corresponding college credit award for apprenticeship training, and/or related trades theory classroom work supplied by the college, varies from NSY to NSY; and the burden of costs for these credits also varies between the yard and the state in which the NSY and college are located.

The Navy firmly believes that NSY trade workers should earn a college degree. To these ends each of the NSYs have worked with their local colleges to make this as feasible as possible for the apprentice. Several different program designs have been put into practice. These include: (1) college level credit granted for apprenticeship hands-on work, and for classroom trades theory work, such as exists at NSY Long Beach and Norfolk; (2) cooperative education apprenticeship with a community college as done at NSY Norfolk, Charleston, and Pearl Harbor; and (3) pre-apprenticeship

programs such as at Norfolk and Charleston NSYs. In many instances the enrollment of these workers into the college provides for a major portion of the college's enrollment statistics (FTE).

Cooperative education programs are gaining popularity among the NSYs. In operation, the college and the NSY work together to recruit trainees. The trainees initially attend the college's existing technical and education programs for the first two semesters, at their own expense. The student will serve as an apprentice during the summers in the NSY. Once evaluated by the NSY and accepted into the apprentice program, and upon completion of the first year of college the student becomes an apprentice. The second year of college is then attended part-time and paid for by NSY. In the Trident College coop program, student degree completers enter into the third year of the Charleston NSY apprenticeship.

Most of the NSY's now front-load their regular apprentice programs, whereby the community college provides the apprentice with the required related academic training during the first year of the apprenticeship. Those trainees not academically prepared to handle this work would be identified early on, and terminated from the program or provided remediation.

Table 1 presents a summary of the NSY programs. In each case the NSY has a contractual relationship with a local community college to provide the related trades theory, written and verbal communications skills, and math and science necessary to carry out their duties; and perhaps prepare for future management positions.

It is noteworthy that most NSY superintendents and general management have come from the ranks of shipyard apprentices.

Table 2

Apprenticeship Programs

Naval Shipyards	Active Appren Prgm/# trades	C.C. prov. options	Coop. Pgm Option	# of Apprent. Currently	% dn from 1985	Cost per Apprent.	Deg/Cert earned	Credit for OJT	Credit for Coop	Cost Effects
Pearl *1	Yes/7	Honolulu C.C.	Yes	180	10	-	A.A.	No	Yes	NI
Mare Island *3	Yes/28	Solerno College	No	421	55	None/free	A.S.	No	---	CA
Puget Sound *2	Yes/41	Olympic College	No	550	28	100,000	A.S.	Yes	---	WA
Long Beach *4	Yes/4	Long Beach City College	No	38	80	None	A.S.	Yes 9 Theory 4/sem/OJT	OJT	CA
Philadelphia *5	Yes/32	Spring-garden Univ	Yes	371	65	1,000	A.A.	Yes 12	Yes	None
Charleston *6	Yes/20	Trident	Yes	180 (40 are Coop)	60	3,000		40-50qh	Yes	None
Portsmouth *7	Yes/30	Beaser College	No	250	50	-	-	Yes	---	None
Norfolk *8	Yes/10	Tidewater	Yes	661	50	$572	A.S.	Yes 21.5 cr	Yes	None

Notes

1. NSY Pearl working on a coop program which will provide 50% of its opportunities in future. Currently there are 80 coop students who work 2 summers in Yard while attending college. Coop students upon satisf. graduated with degree; then enter the NSY apprenticeship program without any entrance exam.

2. NSY Puget uses a 3 week on-the-job followed by 1 week in classroom model. Additional humanities credits offered after hours via Olympic College will qualify apprentice for the Associate in Technical Arts degree. Note that 30% of these entrants come in with an AS degree and another 10% have a Bachelors degree.

3. NSY Mare is currently working with the Salerno County business community and the Vallejo Unified School District toward starting a coop program in the summer of 1993. They had one in the 1970s.

4. NSY LB currently has its program on hold. Yard is downsizing.

5. NSY Philadelphia - Program closing down as yard is scheduled to close. Springgarden College awards 12 credits for work in yard. Coop program is under development which will provide 1-2 years towards apprenticeship.

6. For coop students AS from Trident coop program, enter into 3 year apprenticeship at NSY. NSY Charleston is employing coop as a means of entry. Student pays for coop program.

7. NSY Portsmouth is currently in bid process for new college support. Articulation agreement with NHVTC provides for college credit for apprenticeship work. 1,600 workers out of current 8,000 in yard were apprentices.

8. NSY Norfolk. Pre-apprenticeship program is operating also Jr/Sr High School students work summers, then go to TCC for 2 semesters, then go to work in yard. Their 3th and 4th semester at TCC is then paid for by NSY. In regular apprenticeship program, academics are front-loaded to maximize best apprentices going on. 18% of entrants already have an AS degree.

Commercial Maritime Industry Apprenticeships. Not unlike their federal counterparts, private sector yards conduct similar programs using community colleges to provide related instruction and college degree credit. In many instances the enrollment of

these workers into the colleges provides for a major portion of the college's enrollment statistics (FTE). Several programs in the private sector shipbuilding firms were reviewed. Each of the firms conducted apprenticeship programs and offer trainees opportunities to earn college level credit through linkages with community colleges.

Norfolk Shipbuilding's apprenticeship program is 3 years in length, and offered in seventeen different trade areas. Like each of the other three programs discussed herein, Norfolk Shipbuilding pays the full cost of an apprentice's training. Tidewater Community College (TCC) provides the related trades instruction -- on-site at the shipyard -- and compliments the program with academic subjects necessary to successful job performance in the chosen trade. Many of the firm's top management have come from apprentice ranks. TCC awards an Engineering Technology Certificate for program completion; and an associate degree upon completion of several additional arts and sciences courses.

A very well recognized pre-apprenticeship program which provides an entre into Norfolk Shipbuilding's program is conducted by the Tidewater Maritime Trades Foundation called the Tidewater Maritime Training Institute (TMTI).[12] TMTI has been in operation since 1982, and has successfully provided entry-level training for almost two dozen Tidewater area shipbuilding firms -- entry-level

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[12]. Cantor, J.A. (1986, June). "The Job Training Act and Shipbuilding: A Model Partnership." Personnel Journal, pp. 118-125.

to apprenticeship training. TMTI is a non-profit educational foundation (IRS Code 501c3) whose members are the area shipyards. TMTI trainees are taken into the Norfolk Shipbuilding program with credit for 18 months of the 3 year program.

The Newport News Shipbuilding and Drydock Company operates a prestigious 4 year apprenticeship program in 20 trade areas. Thomas Nelson Community College provides on-site related trades theory classes, advanced training, and general education courses to compliment the program. All costs, included college-related course costs are borne by the firm for the apprenticeship training; additional college general education costs are reimbursed by the firm upon successful completion of the college work towards an associate degree. College work follows the apprenticeship training, after hours at the firm. Of noteworthiness, the apprenticeship itself is creditable towards a degree. Apprentice program completers will receive a TNCC Engineering Technology Certificate; upon completion of the additional college courses, the student can earn an associate in science degree in a technology area. About 20% of the apprentices complete the college degree.

The Bath Iron Works program is somewhat different in method of delivery. Its close liaison with the Maine Maritime Academy (MMA) provides an opportunity for a Bath apprentice in any of five different marine design areas to earn an associate degree after completion of 8,000 hours of instruction; and as part of the apprenticeship work with the company. Trade and related education instructors are Maine Maritime Academy faculty, who work on-site at

Bath Iron Works. The MMA and Bath Iron Works developed the program together and jointly operate it. Program options include electrical, HVAC, hull, piping, and structural specializations. About 15 credits of the college curriculum are awarded for the technical hands-on portion of the apprenticeship.

Lastly, *NASSCO*'s 4-year apprenticeship program is supported by San Diego Community College. NASSCO's apprentices attend college related-instruction courses together with apprentices from a number of other firms in the area. Courses are taught on NASSCO's site, or other area firm sites. They earn 3 units of college credit per semester, over 8 semesters -- attending classes 2 nights a week after work hours. However, to complete an associate degree they must complete additional arts and sciences courses on their own, after the apprenticeship period is completed.

Other Funded Apprenticeship Programs

U.S. Navy-NAVAIR rework facilities. NAVAIR operates a 4-year apprenticeship program in several trade areas in cooperation with Tidewater Community College. This program works as a cooperative education apprenticeship. Students accepted into the cooperative program complete the first year as a full-time engineering student at the college. Summer is spent at a Navy facility working as an apprentice. The student is evaluated during the first year. Upon satisfactory completion of the first year of the program, and acceptance into the yard, the student becomes an apprentice and works under the supervision of a master technician for three more years. College work then continues on a part-time basis.

Curtis Bay Coast Guard facility. A 4-year apprenticeship program is sponsored by Curtis Bay. Anne Arundel Community College provides on-site related instruction to accompany this program. Some of the related instruction can be applied towards college credit. Curtis Bay is working on a cooperative education program involving their local vocational-technical high schools with Anne Arundel Community College.

The College Role

College participation varies from program to program. Trident Technical College in Charleston, SC is a leader in cooperative education. The NSY and other Navy programs generate approximately 120 FTE -- or half of all cooperative education programs at Trident. Trident reorganizes the value of the hands-on activity portion of the apprenticeship and grants credit for apprenticeship. An Associate in Technology degree is offered for apprentices. Trident participates actively with the NSY employer, and has a Shipyard Advisory Committee which provides guidance to the program delivery effort. The program was initially developed under a Title VIII Cooperative Education grant.

Tidewater Community College in Norfolk, VA is another leader in apprenticeship program support. Tidewater generates about 250 FTE a year from these programs, and is currently developing an umbrella AS program similar to the Trident Associate in Technology degree. TCC proves a number of delivery methods for the NSYs, including pre-apprenticeship; cooperative education; and on-site related trades instruction. The on-site program equates to 43

college credits and an Engineering Technology Certificate. The additional courses requisite to an AS are offered at the NSY and at the private sector firms such as NORSHIPCO - as after-hours courses.

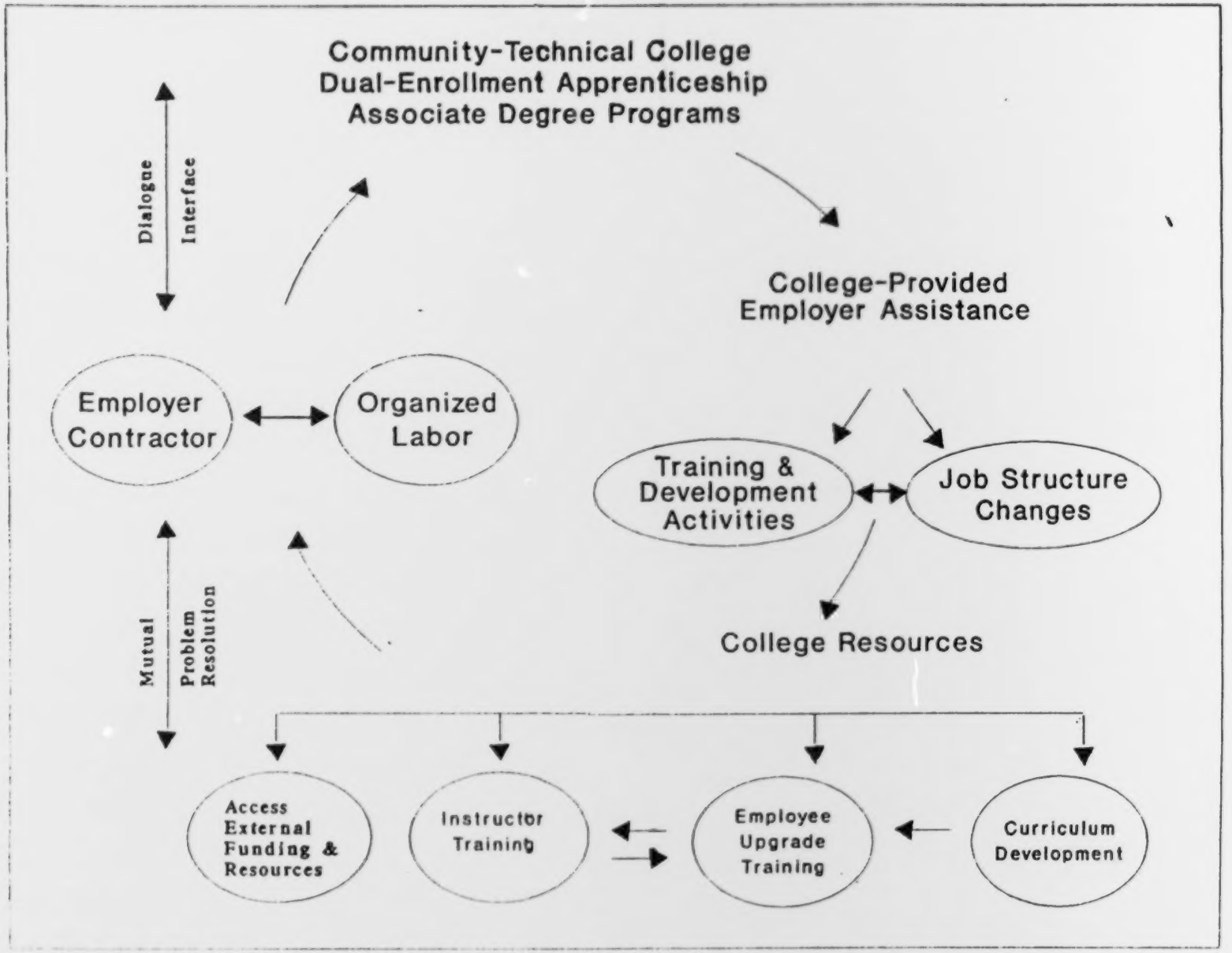
Finances. All of the colleges report counseling students about PELL, GSL, and other sources of funds for any portion of the training program that they had to pay. In California, the program is essentially underwritten by the state as a result of its low tuition status. Programs operating in Maryland, are co-sponsored by the state division of continuing education under Perkins and other federal monies. Private sector programs sponsored by unions are also eligible for joint training trust fund monies. Avondale Shipyard uses JTPA and Perkins funding.

Conclusions and Recommendations

Towards a Solution

Apprenticeship is proven to be more than a training tool or system. It is a potential mechanism for bringing together, in a planned and cohesive manner, the human and capital resources, within a community (business, civic and political), to solve an human resource and training need. As an added benefit, it acts as a catalyst to foster partnerships for training and economic development (see Figure Two).

Collaboration is the key to successful apprenticeship program development. Why then, do employers and colleges (and sometimes labor organizations), collaborate? Findings indicate that collaboration occurs when: (1) all are able to derive mutual


Community-Technical College
Dual-Enrollment Apprenticeship
Associate Degree Programs
Dialogue
Interface
College-Provided
Employer Assistance
Employer
Contractor
Organized
Labor
Training &
Development
Activities
Job Structure
Changes
Mutual
Problem
Resolution
College Resources
Access
External
Funding &
Resources
Instructor
Training
Employee
Upgrade
Training
Curriculum
Development

exchanges from each other (i.e quid pro quo); (2) all are able to access external monies collectively which they otherwise could not obtain; (3) all have conflicting goals, and such collaboration allows for a mediation of these conflicts in a socially approved manners; and/or (4) all formally agree, vis-a-vis a contract stipulating specific roles and responsibilities to collaborate.

Partnerships Derive Mutual Exchanges

The automotive manufacturers, construction industries, organized labor, and the maritime industries collaborate with the community college to reap mutual benefits which alone could not be assessed. Clearly they also collaborate to allow their trainees to master new technologies, and to earn academic college credit simultaneously; sometimes in courses taught by their own union's master-craftsmen. Automotive manufacturers also use the college as a geographical training center for dealership personnel. Construction industries use the college for similar kinds of training activity. One IUOE union apprenticeship coordinator related that "... a decade ago it was hard to find a machinist with a knowledge of numerical control machines (or sic) an electrician with a knowledge of microprocessor or fiber optics..." As a result of partnerships with community colleges, apprentices now are afforded these kinds of skills and knowledge which are highly desired by the employer. Most of the industries surveyed also

recognized positive community recognition for their participation in apprenticeship-higher education partnerships.

A firm belief in the value of higher and continuing education must be evident to all concerned in a community college apprenticeship program. Automotive manufacturers, IBEW and IUOE leadership, and maritime industry officials all believe in college level technical education as a basic necessity to today's and tomorrow's workers. Without such a belief the program will not develop or last. Additionally, the term "quid pro quo" takes on new meaning in the development of these programs. Unless there is a clear benefit to all parties concerned such cooperative relationships do not work or last. Likewise clear means and methods for communication must be institutionalized.

Accessing External Funds

Training programs require significant costs in times of tight budgets. Often paybacks are long in coming and not readily measurable by an employer. The funding of a training program is no simple matter. Unions, employers, and in some cases industry groups use Joint Apprenticeship Trust Funds to mutually support apprentice training. The Training Trust Fund concept continues to be used as a mechanism for jointly funding apprenticeship programs and projects, and should compliment dual-enrollments with the community college. Unions have successfully accessed external monies as a result of partnerships with higher education. For instance, under the Comprehensive Employment and Training Act of 1973, an estimated 265,000 apprentices received training, costing

185 million dollars from 1963-1976. Most of the locals are using some Perkins funding as well. More dialogue is needed between local union apprentice coordinators and community college personnel to explore these funding opportunities. This revenue source makes it more desirable for organized labor and community colleges to cooperate for apprenticeship training. Other funding such as Perkins and JTPA also are used, but need to be recognized and accessed more often by employers.

Formal Contracts

The local #3 program and the U.S. Navy have by far, the most formal arrangements of the programs reviewed. It serves as a model for other programs. Other IUOE programs had some forms of written agreements for credit award; for faculty use; instructor compensation; etc. Automotive manufacturers also use formal written agreements. The federal government usually uses the competitive bidding process to secure these services. Formal agreements are important for program continuity and for mutual understanding of roles and responsibilities.

Partnerships Can Mediate Conflicts

Apprenticeship has traditionally provided a mechanism for organized labor and employers-contractors to jointly control and monitor employee training and development. In recent years it also has provided a way to control to some degree technological changes in the workplace through a phase-in process with employee retirement and replacement. The apprenticeship serves as a mechanism for using the community college as a training resource,

economic development catalyst, and source of technical advise and consultation. However, to do so, partners must alleviate barriers through communication. The use of the Joint Industry Board as demonstrated by IBEW local #3 has proven successful in this regard. The Maryland community colleges also cite examples of technology upgrade training via dual-enrollment apprenticeships. As a training ground for tomorrow's union leaders and business people, apprentice participation on these committees gives the potential leader experience in mediation and problem-solution formulation.

In Closing...

Dual-enrollment of apprentices in Associate Degree Programs is a practice which must be promoted. It has proven to be the most cost - effective mechanism for organized labor to provide worker training, and to control its ultimate delivery and quality. It further guarantees continued worker participation in the organized labor movement into the 21st century.

Clearly, over the next eight years we will see some revolutionary changes in our system of education in the United States. Business and industry will take on a predominant role in the development of policy, and perhaps in the operation of educational programs. I believe that apprenticeship as a form of structured workplace learning will become, once again, an accepted practice -- but this time in higher education.